

Kit 16353-49, Installation Kit only
Kit 16353-52, Installation Kit with Model 353 I/O Expander Board
Kit 16357-39, Installation Kit with Model 353R I/O Expander Board

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I/O Expander Board Kits for Model 353 Process Automation Controller and Model TGX:353RCM_ _ _B_ Control Module

This instruction describes installation of the above listed I/O Expander Board Kits. A copy of the User's Manual for the controller at hand must be available for detailed installation information, important Cautions and Warning, and approvals and certifications; refer to the following table.

Controller	User's Manual
Model 353, Design Level A ¹	UM353-1
Model 353, Design Level B ¹	UM353-1B
Model TGX:353RCM_ _ _B_ Control Module	UM353R-1
The current revision of a manual can be downloaded from the Siemens Internet site. See the Customer/Product Support section of this publication.	

Before beginning a Model 353, Design Level A installation:

- MPU Controller Board software must be version 1.20 or later. To determine the software version, refer to the User's Manual, Section 3 Function Blocks, STATN - Station Parameters.
- The case must have connectors with a total of 52 terminals; see Figure 1. Mounting case options 2 and 4 have 52 terminals - see the controller's nameplate and the Model Designation and Specifications section of UM353-1 for the ordered case option. Mounting case option 1 (26 terminals) can be expanded to 52 terminals plus an Ethernet connector by installing Connector Socket Assembly Kit PN 16353-230. Refer to UM353-1, Model Designation and Specifications section to order case option 4, a 52 terminal case with an Ethernet connector.

Before beginning a Model 353, Design Level A or B, or a Model 353R installation:

- Terminal connectors on Model 353 can be removed for ease of wiring. Refer to the User's Manual.
- An I/O Expander board is supplied in a static shielding bag. Do not remove the board from the bag until you are wearing a properly grounded wrist strap and the board is to be installed.
- An anti-static service kit with a conductive wrist strap and a static-dissipative mat must be used while handling an electronic assembly, such as the I/O Expander board.
- Typical tools for servicing electronic assemblies should be available. A narrow (1/8") straight blade screwdriver is needed for a connector's terminal screws.
- A torque screwdriver with a 1/8" blade width should be used to tighten terminal screws to 5 in. lbs (0.56 N m). Do not over tighten.
- The process and instrumentation drawing (P&ID) for the involved loops should be available.
- Before wiring, check the controller nameplate for power input requirements, installed options, electrical approvals, and other important information.

¹ Refer to the controller nameplate and the Model Designation and Specifications section of the User's Manual for the Design Level character. The Design Level is specified by the next to last character in the model designation.

KIT CONTENTS

There are separate I/O Expander Board kits for Model 353 and Model 353R. The Range Resistor and Reference Junction kit is included in both kits.

Model 353, PN 16353-52 I/O Expander Board Kit – This kit is used to field install an I/O Expander board in a Model 353, Design Level A or Design Level B. The I/O Expander Board is factory installed when a Model 353, Expansion Board option 1 is ordered.

DESCRIPTION	QUANTITY
I/O Expander Board	1
Range Resistor and Reference Junction Kit	1

Model 353R, PN 16357-39 I/O Expander Board Kit – This kit is used to field install an I/O Expander board in a Model 353R. The I/O Expander Board is factory installed when a 353R Controller with I/O Expansion Board option (P/N TGX:353RCM E _ _ B_) is ordered. Also, use this kit to add an I/O Expander board to a Procidia™ i|pac™.

DESCRIPTION	QUANTITY
I/O Expander Board	1
Range Resistor and Reference Junction Kit	1




PN 16353-49 Range Resistor and Reference Junction Kit - This kit is supplied with the above I/O Expander Board Kits and with a Model 353 or Model 353R with a factory installed I/O Expander Board.

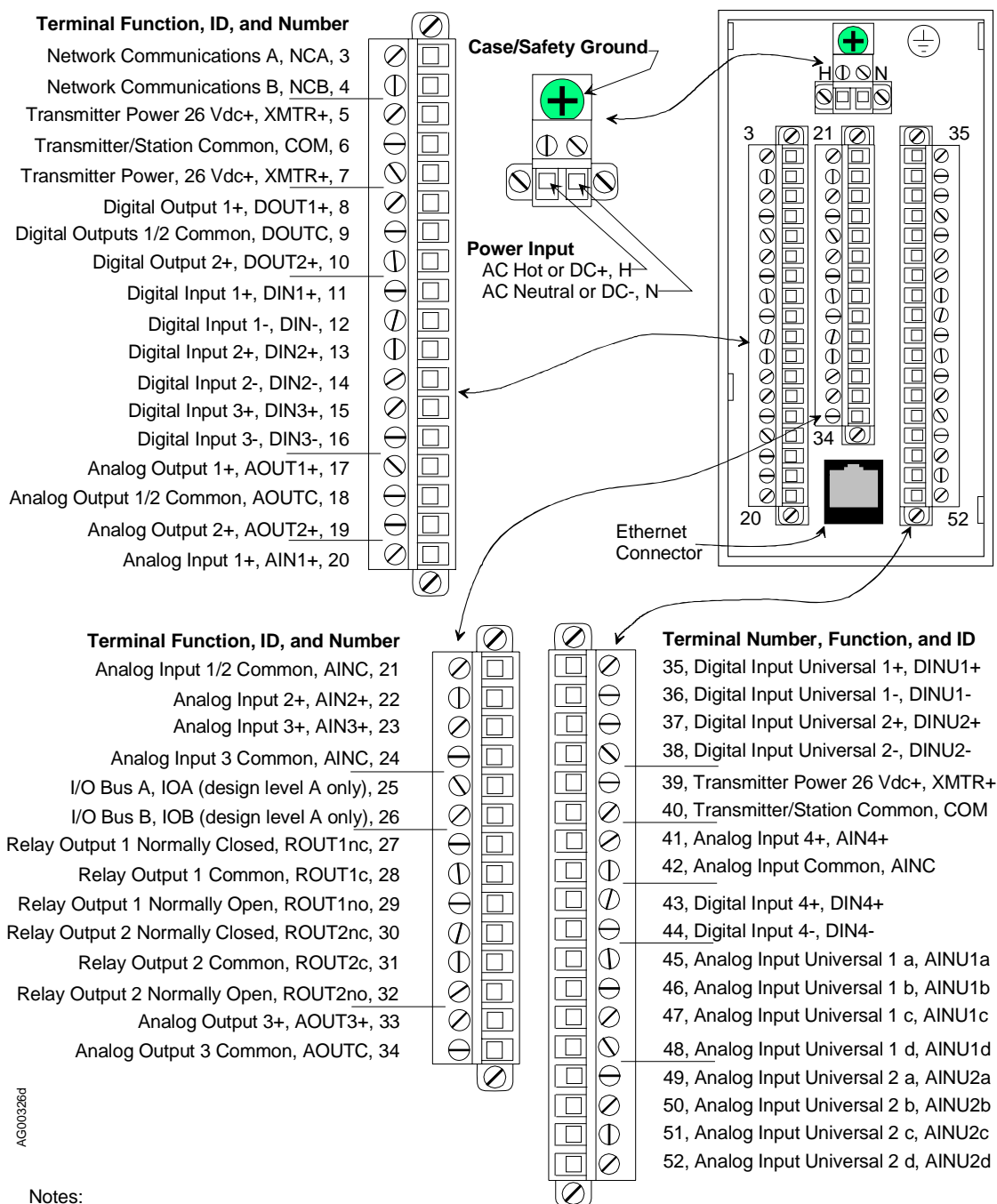
DESCRIPTION	QUANTITY
4-20 mA to 1-5V Range Resistor, 250Ω, 0.1%, 3W, WW	1
4-20 mA to 15-75 mV Range Resistor, 3.75Ω, 0.1%, 3W, WW	2
Sleeving	5
Crimp-On Connector	6
TC Reference Junction, 100Ω	2
Kit Installation Instruction (this Instruction)	1

INSTALLATION

Installation of range resistors and the thermocouple reference junctions for function blocks AIN4, AINU1 and AINU2 will be described first. Refer to the Installation section of the appropriate User's Manual for important cautions and warnings, approvals and certifications, and other installation information. (For Procidia™ i|pac™ refer to UMiPAC-1.) I/O Expander Board installation is beyond the scope of this instruction; refer to the appropriate User's Manual. Views of Expander boards are given in Figure 7.

Figure 1 shows Model 353 rear terminals. Model 353R field connections are shown in Figure 2.

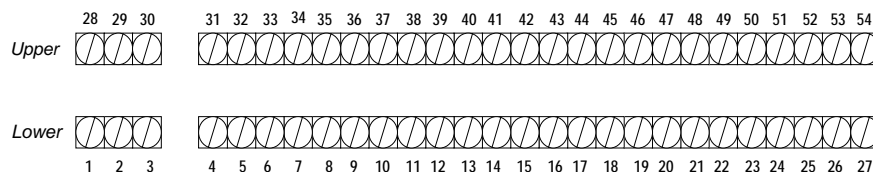
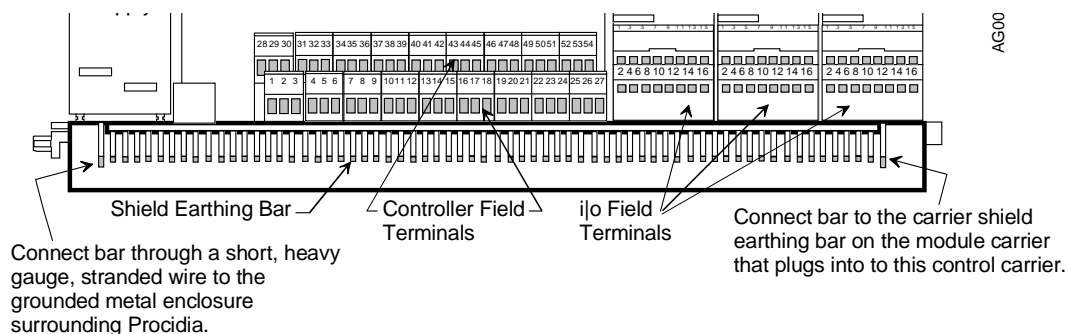
 WARNING		
	Electrical shock hazard Explosion hazard Can cause death, serious injury or property damage	
	<ul style="list-style-type: none"> Remove power from all wires and terminals before working on equipment. In potentially hazardous atmosphere, remove power from equipment before connecting or disconnecting power, signal, or other circuit. Observe all pertinent regulation regarding installation in hazardous area. 	



Notes:

- Terminal numbers are shown on each connector. The plug-in portions of the connectors are packed with a case. The connectors are keyed.
- Case/Safety Ground - Connect to green screw at top center of rear terminal area.
- NCA and NCB
Design Level A - Connect LIL Twinaxial Cable or twisted pair wiring. Refer to UM353-1, Section 8.4.9 for additional details.
Design Level B - Connect Modbus cable or twisted pair wiring. Refer to UM353-1B, Section 7.4.9 for additional details.
- IOA and IOB
Design Level A - LonWorks bus connections. Twisted pair wiring is typical.
Design Level B - No connection
- Ground Bus - An external, user-supplied ground bus can ease connection of multiple grounds, particularly when twinaxial cable shields are to be grounded.

Figure 1 Model 353, Rear Terminal Layout and Terminal Assignments



LOWER TERMINALS				UPPER TERMINALS			
Description	Board	ID	#	#	ID	Board	Description
Relay Output 1	EXP	ROUT1nc	1	28	ROUT2nc	EXP	Relay Output 2
	EXP	ROUT1c	2	29	ROUT2c	EXP	
	EXP	ROUT1no	3	30	ROUT2no	EXP	
Digital Outputs 1 & 2	MPU	+24Vdc	4	31	NCA	MPU	Network
	MPU	DOUT1+	5	32	NCB	MPU	Modbus or LIL
	MPU	COM	6	33	+24Vdc	MPU	Analog Input 1
	MPU	+24Vdc	7	34	AIN1+	MPU	
	MPU	DOUT2+	8	35	AINCom	MPU	
Digital Inputs 1 - 4	MPU	+24Vdc	9	36	+24Vdc	MPU	Analog Input 2
	MPU	DIN1+	10	37	AIN2+	MPU	
	MPU	DIN1-	11	38	AINCom	MPU	
	MPU	DIN2+	12	39	+24Vdc	MPU	Analog Input 3
	MPU	DIN2-	13	40	AIN3+	MPU	
	MPU	DIN3+	14	41	AINCom	MPU	
	MPU	DIN3-	15	42	+24Vdc	EXP	Analog Input 4
	EXP	DIN4+	16	43	AIN4+	EXP	
Analog Outputs 1 - 3	EXP	DIN4-	17	44	AINCom	EXP	
	MPU	COM	18	45	+24Vdc	EXP	Universal
	MPU	AOUT1+	19	46	DINU1+	EXP	
	MPU	AOUTCom	20	47	DINU1-	EXP	
	MPU	AOUT2+	21	48	DINU2+	EXP	Digital Inputs 1 & 2
Universal	MPU	AOUTCom	22	49	DINU2-	EXP	
	EXP	AOUT3+	23	50	FAIL	MPU	
	EXP	AINU1a	24	51	AINU2a	EXP	Analog Input 2
	EXP	AINU1b	25	52	AINU2b	EXP	
	EXP	AINU1c	26	53	AINU2c	EXP	
Analog Input 1	EXP	AINU1d	27	54	AINU2d	EXP	

Figure 2 Model 353R, Field Terminal Locations and Assignments

RANGE RESISTORS

Signal input terminals are connected to software function blocks within the controller. Install a range resistor at an analog input terminal pair to convert a 4-20 mA input signal to the DC voltage required by the related function block; see Table 1. Typical wiring for Model 353 AIN4 and AINU1 is shown in Figure 3. Figure 4 shows wiring for AIN4 and AINU1 for a Model 353R. Terminal numbers are stated in Table 1. Table 2, on the next page, shows AINU parameter settings for a 4-20 mA source. Refer to the User's Manual for other input types.

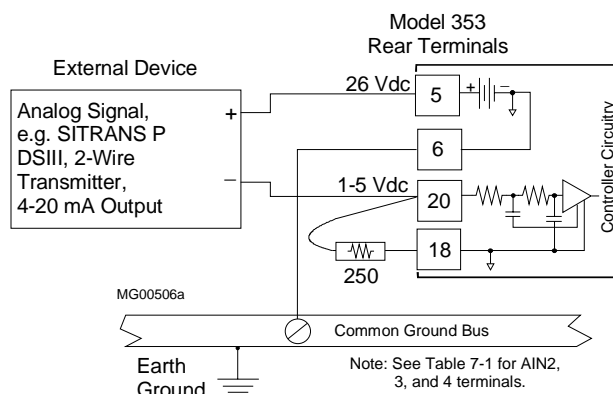
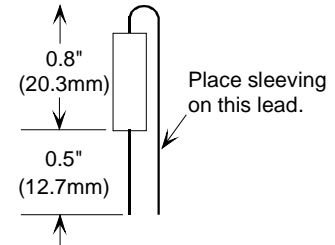
Table 1 Function Block/Input vs. Case Connector Connections

I/O Expander Board FB and Analog Input	Model 353 Terminals	Model 353R Terminals	Range Resistor or TC Reference Junction
AIN4+	41	43	250Ω
AIN4c	42	44	
AINU1a (see note above)	45	24	TC Reference Junction
AINU1b	46	25	3.75Ω
AINU1c	47	26	
AINU1d	48	27	TC Reference Junction
AINU2a	49	51	TC Reference Junction
AINU2b	50	52	3.75Ω
AINU2c	51	53	
AINU2d	52	54	TC Reference Junction

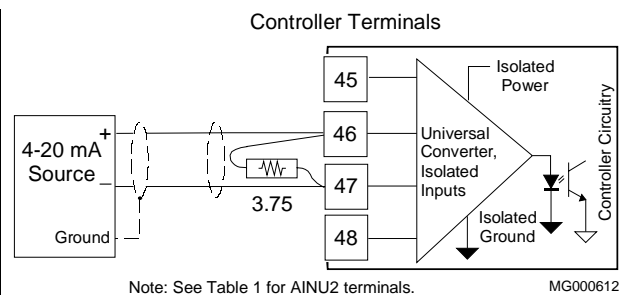
Perform the following steps for each 4-20 mA input.

1. Select an analog input terminal pair for installation of a range resistor. Refer to Table 1 and to the Installation section of the User's Manual for wiring details.
2. Select a range resistor (250Ω or 3.75Ω, see Table 1) from the kit and insulate the formed resistor lead with a piece of sleeving. At the lead end, a length of bare lead should be exposed.

If a crimp-on connector is to be used, go to step 3. Otherwise, go to step 4.



Analog Input AIN4, 2-Wire Transmitter



Analog Input AINU1, 4-20 mA Source

Figure 3 Model 353, Analog Input Wiring Examples

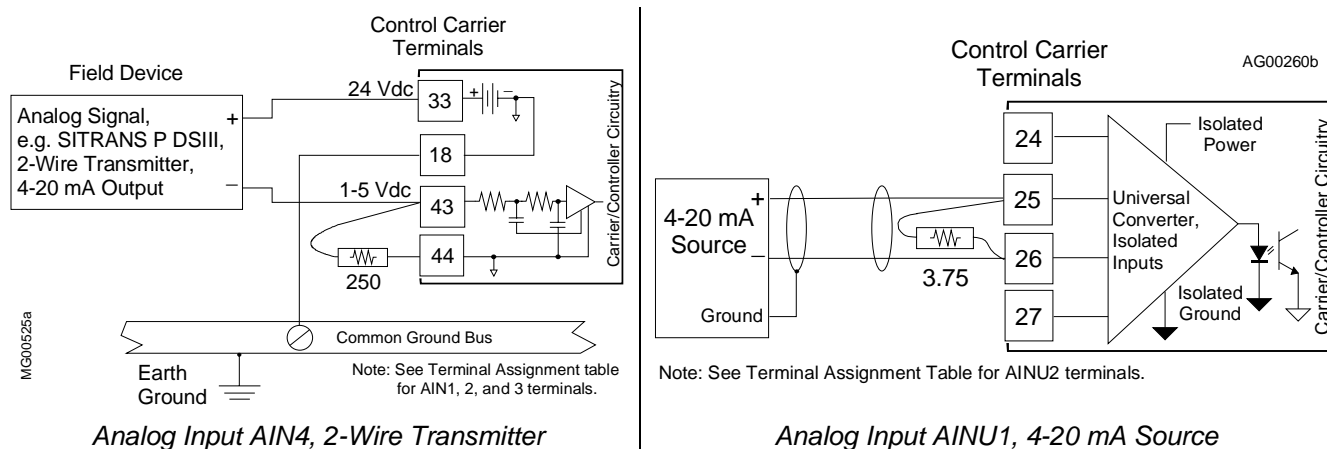


Figure 4 Model 353R Analog Input Wiring Examples

3. Crimp-On Connector - Insert the resistor lead and any signal wiring into the connector until the wire ends are visible at the pin end of the connector. Be certain that all wires are inserted in the connector. Use a standard electrical connector crimp tool to crimp the connection.
4. Loosen the two terminal screws using a straight blade screwdriver with a 1/8" (3 mm) blade width. Insert the resistor leads, wires, or crimp-on connector pins (as appropriate) into the two square openings in the connector adjacent to the selected terminal numbers.
5. Check that all involved components and station wiring are fully inserted and carefully tighten the screws. See page 1 for torque specification. Do not over tighten.
6. Carefully dress resistors and wiring so that excessive stress is not placed on a component, wire, or connection.
7. Repeat the above steps for other analog inputs (e.g., AINU2) as necessary. (Note: The range resistors and crimp-on connectors for AIN1, 2, and 3 are supplied in the Power Input and Range Resistor Kit furnished with a Model 353 or a Model 353R.)

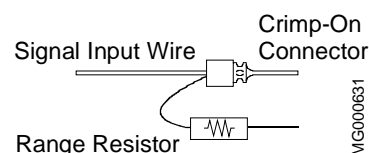


TABLE 2 AINU Millivolt Input Parameter Settings for a 4-20 mA Source*

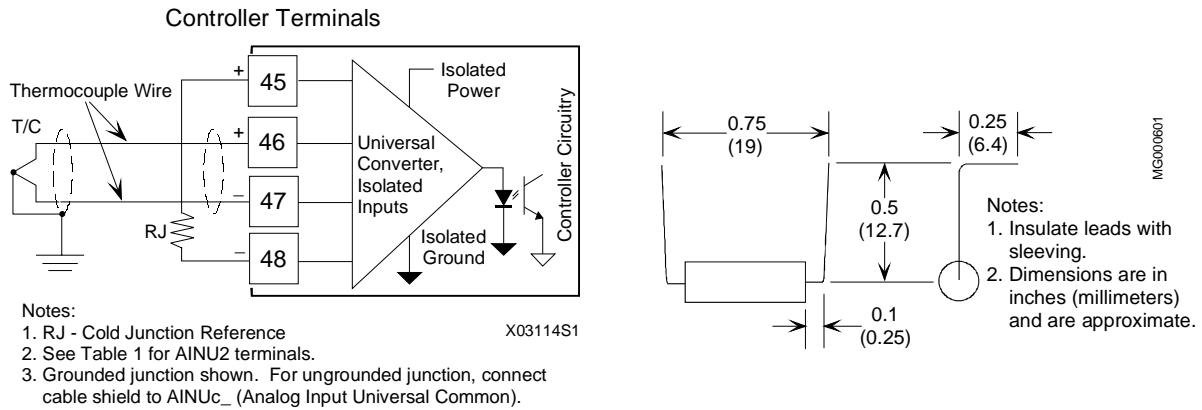
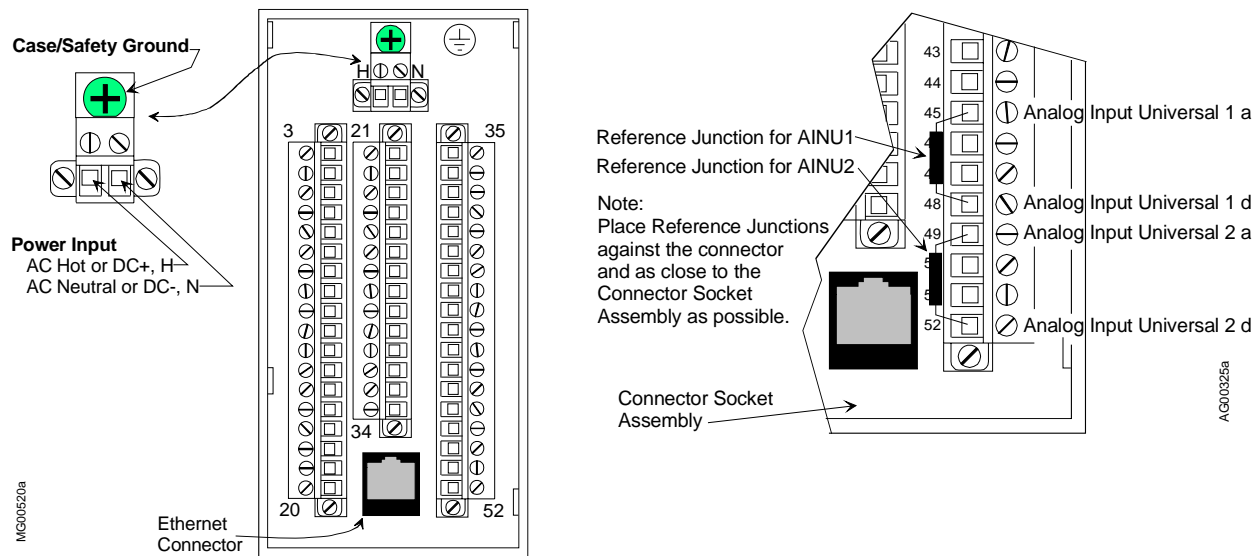
SENSOR TYPE	SENSOR MIN.	SENSOR MAX.
15	15 mV	75 mV

* Table settings apply when using the supplied 3.75Ω resistor.

THERMOCOUPLE REFERENCE JUNCTION

When function block AINU1 or AINU2 is configured as a thermocouple input, a reference junction must be installed. Typical wiring for a Model 353 is shown in Figure 5. Model 353R wiring is similar.

1. Place a 0.5" length of sleeving on each reference junction lead. Carefully form the leads as shown in Figure 5.
2. Refer to Figure 1 or 2 and loosen the two terminal screws using a straight blade screwdriver with a 1/8" (3 mm) blade width. Insert the reference junction leads into the two square openings adjacent to the selected terminal numbers.
3. Carefully locate the reference junction body against the connector. See Figure 6 for Model 353. Model 353R placement is similar.
4. Check that all involved components and station wiring are fully inserted and carefully tighten the screws. See page 1 for torque specification. Do not over tighten.
5. Repeat the above steps if the other AINU function block is to be used as a thermocouple input.

*Model 353, Thermocouple Wiring**TC Reference Junction Lead Forming***Figure 5 Thermocouple Input***Rear Terminals, Direct Entry**Reference Junction Connections and Locations***Figure 6 Model 353, Rear Terminals and Reference Junction Installation**

I/O EXPANDER BOARDS

Model 353 and Model 353R I/O Expander boards are shown in Figure 7. Refer to the Maintenance section of the appropriate User's Manual for an installation procedure.

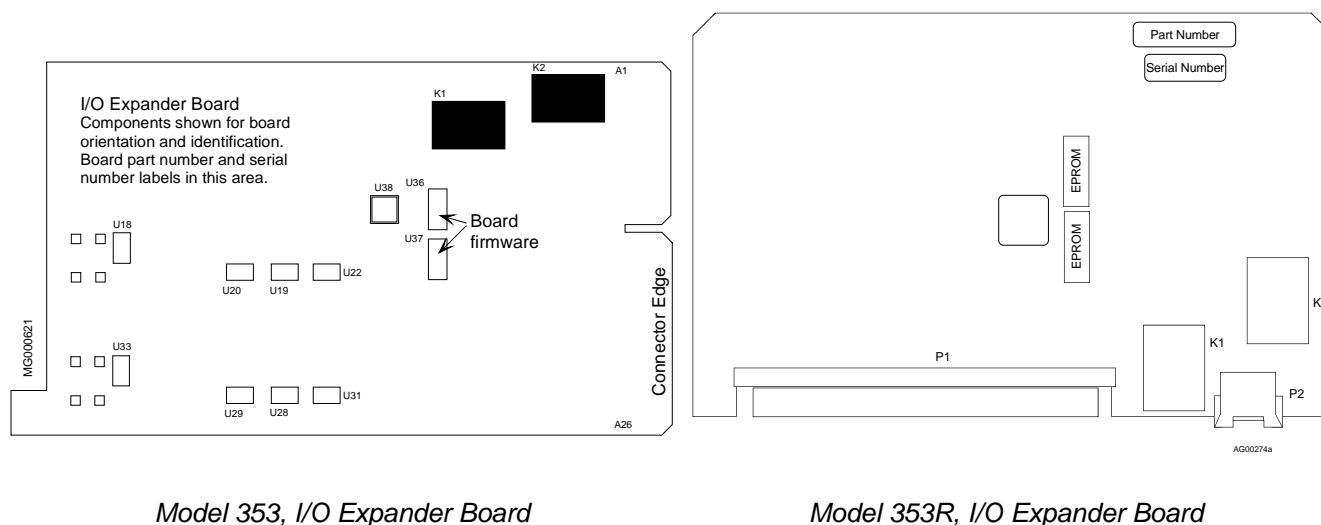


Figure 7 I/O Expander Boards, Simplified Views

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